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**Assessment Cover Page**

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| *Module Title* | Strategic Thinking |
| *Assessment Title* | CA 1 – Drought in Mexico |
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**Declaration**

By submitting this assessment, I confirm that I have read the CCT policy on academic misconduct and understand the implications of submitting work that is not my own or does not appropriately reference material taken from a third party or other source.

I declare it to be my own work and that all material from third parties has been appropriately referenced.

I further confirm that this work has not previously been submitted for assessment by myself or someone else in CCT College Dublin or any other higher education institution.

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# Introduction:

“Mexico City is running out of water due to a drought crisis affecting 22 MILLION as 'Day Zero' when its supply won't be enough for residents is just weeks away” (Torres, 2024)

Currently at least 70% of Mexico suffers from water shortage, indicators show that the drought is increasing by 2024, approaching one of its worst droughts on record.

This event is not something new for the country, during 2020 and 2021 more than half of the Mexican territory was affected by the second most severe drought recorded since 2003, the first happened in 2011, according to the drought monitor of the National Water Commission (CONAGUA)

Droughts in Mexico are a problematic that is happening now and more and more frequently. It is a country with a lot of biodiversity and extensive hydrography; however, the volume of water decreases considerably between the dry season and the rainy season, due to the climate change and human actions.

We will be able to find a lot of information about water in Mexico, the availability in the country, rainfall, drought records by severity, among many other databases that are within our reach and that are free to use.

Will analysing this data and finding a model that helps project future droughts be able to convince citizens about the importance of water care? The answer is, in an ideal world it would be enough but the reality is different. Therefore, with the information obtained from this Project, it is expected to project the situation of Mexico in the future on droughts and water availability and thus be able to make decisions and actions based on this situation.

In this project you will be able to find the current drought situation in Mexico, how they are classified by facets and what are their characteristics. It will also be explained who are the organizations that record this information and the databases used.

Some factors identified by the UNAM (National Autonomous University of Mexico) that favour water scarcity will also be discussed, to find out if there is a relationship and to be able to predict the amount of water available by 2025 per capita.

The priority of this Project is to find the municipalities with the most severe droughts by 2025 and the month in which this happens, using machine learning models that help predict them. It will be explained what models were used and how the databases were used.

Water is a valuable and important resource and making use of the knowledge learned to help visualize the situation in Mexico is a first step to making change.

# Objectives:

The main objective of this Project is to present information on the situation of droughts, identifying through predictions which municipalities in Mexico will suffer from the most severe droughts and the period of time in which this happens in 2025, as well as classifying the level of drought by each state

Additional predictions will be presented about the availability of water by region or by State in 2025, taking into account factors that could be relevant to the cause of water shortages.

# Problem Definition:

Due to the Environmental problem that Mexico suffers, severe droughts have occurred during the last 20 years with or without many actions to reduce it, this leaves us uncertain as to what the droughts will be like in 2025, therefore, to have a better visualization of the problem that is approaching, the levels of drought will be forecast by cities and states, so the pertinent actions can be taken to solve or improve the situation, as well as inform the citizens since “Mexico must address the water problem with data and evidence” (Instituto Mexicano para la Competitividad A.C., 2023)

# Scope:

Water scarcity is a global problem, but for this Project we will only focus on the information obtained from Mexico.

The purpose of this Project is not to find the Source, diagnose the cause of droughts, or propose actions to solve it.

It is a Project that will provide information on what 2025 could be like in Mexico related to droughts. The following points list the outcomes that are expected to be achieved:

* Projection of the main municipalities with severe drought D04 and D03 in Mexico (only with recorded historical data) pending definition of whether it is monthly or biweekly
* Biweekly or monthly forecast by state of drought level in 2025 (only with registered historical data)
* Including 3 representative databases that affect the available volume of water, such as population growth, historical rainfall, presence of agriculture in the state and water treatment, the relation between these factors and the drought will be sought and, if it exists, it will be used to project the amount of water available per state.

# Data Sources:

The sources where the databases will be obtained are two mainly:

* CONAGUA: It is an institution that is responsible for the preservation and administration of national waters for their sustainable administration.

Its databases are published on the Mexican government's website called Open Data and are free to use: [Datos Abiertos de México - datos.gob.mx](https://datos.gob.mx/libreusomx)

* INEGI: ‘It is an autonomous public body responsible for regulating and coordinating the National System of Statistical and Geographical Information, as well as for collecting and disseminating information about Mexico in terms of territory, resources, population and economy’. (Instituto Nacional de Estadística y Geografía (INEGI), 1983)

The databases used are the following:

* History of the drought in each municipality

Source: CONAGUA

This database is our main source of information, they have daily and biweekly records since 2003.

* Population growth

Source: INEGI

* Rainfall

Source: CONAGUA

Behaviour of monthly average rainfall at the state and national level from 1985 to date, measured through conventional and automatic stations

* Agricultural sector

Source: INEGI

Number of agricultural activities in the country by state.

* Water availability

Source: CONAGUA

Average water availability per capita.

# Ethical Considerations:

This project is carried out during elections in Mexico; therefore, the use of the data and its interpretation must be neutral, this means not representing an official Government position.

Because it is a current problem, the data must be used with discretion, not used to deceive or confuse the population by changing the original meaning of the information and its veracity.

The information presented must be impartial, honest and transparent in order to optimally aid in decision-making.

**GitHub link:**

https://github.com/CCT-Dublin/capstone-project-feb-2024-ft-Denisse14GT

# References

Epicentro Geografico. (2021). *Ríos de México: vertientes y cuencas - Epicentro Geográfico*. [online] Available at: <https://epicentrogeografico.catedrauno.com/2021/02/rios-de-mexico-vertientes-cuencas-mapas/> [Accessed 28 Mar. 2024].

Geografía (INEGI), I.N. de E. y (n.d.). *Quiénes somos*. [online] en.www.inegi.org.mx. Available at: <https://en.www.inegi.org.mx/inegi/quienes_somos.html>.

Nota informativa Situación del agua en México. (2023). [online] *IMCO.org*. Instituto Mexicano para la Competitividad A.C. Available at: <https://imco.org.mx/wp-content/uploads/2023/02/Nota-IMCO_La-situacion-del-agua-en-Mexico-1.pdf#:~:text=M%C3%A9xico%20debe%20abordar%20la%20problem%C3%A1tica%20del%20agua%20con> [Accessed 28 Mar. 2024].

Salvador, D.G.C., Ernesto Núñez Flores, Roberto Ramírez García, Julio César Romero (2021). *La sequía severa en México*. [online] Ciencia UNAM. Available at: <https://ciencia.unam.mx/leer/1146/la-sequia-severa-en-mexico> [Accessed 28 Mar. 2024].

Secretaría de Medio Ambiente y Recursos Naturales (2021). *Estadísticas del Agua en México*. [online] Available at: <https://agua.org.mx/wp-content/uploads/2023/10/EAM_2021.pdf>.

smn.conagua.gob.mx. (2024). *Monitor de Sequía en México*. [online] Available at: <https://smn.conagua.gob.mx/es/climatologia/monitor-de-sequia/monitor-de-sequia-en-mexico> [Accessed 27 Mar. 2024].

Torres, A. (2024). *Mexico City is running out of water due to a drought crisis*. [online] Mail Online. Available at: <https://www.dailymail.co.uk/news/article-13215895/Mexico-City-running-water-drought-crisis-day-zero.html> [Accessed 28 Mar. 2024].

www.gob.mx. (n.d.). *Comisión Nacional del Agua | Gobierno* . [online] Available at: <https://www.gob.mx/conagua/que-hacemos>.